REMARKS

Claims 5-19 are pending, and claims 1-4 have been withdrawn from consideration as directed to a non-elected invention.

In the Office Action, the Examiner rejected claims 10-16 under 35 U.S.C. § 103(a) as unpatentable over Ohuchi (U.S. Patent No. 6,762,468) in view of Ast et al. (U.S. Patent No. 5,516,724) and Bar-Gadda (U.S. Patent No. 6,579,805); and rejected claims 17-20 under 35 U.S.C. § 103(a) as unpatentable over "admitted prior art" (APA) in view of Ast and Bar-Gadda. Applicant notes that claim 20 was cancelled by the Amendment filed on March 29, 2005, and therefore the rejection thereof is moot. Applicant also notes that the Examiner did not address claims 5-9 in the Office Action, but these claims are allowable for reasons stated below.

Applicant traverses the claim rejections under 35 U.S.C. § 103(a), because a prima facie case of obviousness has not been established.

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. M.P.E.P. § 2143, 8th ed., Revision of May 2004.

The rejection of claims 10-16 under 35 U.S.C. § 103(a) as unpatentable over Ohuchi in view of Ast and Bar-Gadda is improper, at least because Ohuchi, Ast, and Bar-Gadda, taken alone or in combination, fail to teach or suggest each and every element of these claims.

For example, independent claim 10 recites a method of manufacturing a semiconductor device that includes, inter alia, "thermal-oxidizing the gate electrode in an atmosphere that contains an oxidant for oxidizing Si and a reductant for reducing Ge to form a sidewall insulating film on a sidewall surface of the gate electrode."

The Examiner acknowledged that "Ohuchi differs from the claims in not disclosing that the oxidation atmosphere contains an oxidant for selectively oxidizing Si and a reductant for reducing Ge." Office Action, pp. 2-3. In other words, Ohuchi fails to teach or suggest at least "thermal-oxidizing the gate electrode in an atmosphere that contains an oxidant for oxidizing Si and a reductant for reducing Ge to form a sidewall insulating film on a sidewall surface of the gate electrode," as recited in claim 10.

The Examiner relied on Ast et al. to cure Ohuchi's deficiencies regarding claim 10. In doing so, the Examiner made multiple allegations. Without subscribing to any other allegations made by the Examiner, Applicant traverses three of these allegations.

First, the Examiner alleged that Ast et al. "teaches steam is an oxidation condition in which SiGe is selectively oxidized to form silicon oxide while Ge in the SiGe layer is not oxidized (col. 5, lines 19-25; col. 6, lines 8-13; col. 4, lines 28-30; col. 8, line 50)." Office Action, p. 7. This allegation is not correct. Applicant quotes relevant portions of Ast et al. below:

a). "The alloy layer 14 preferably comprises germanium and silicon, wherein germanium has a low affinity to oxygen and silicon has a high affinity to oxygen. Accordingly, when exposed to oxygen, the silicon in the alloy will oxidize preferentially while the germanium will not readily react with the oxygen." Ast et al., col. 6, ll. 8-13.

b). "A first material of the alloy may have a low affinity to a third material thereby resisting reaction with the third element. A second material of the alloy may have a high affinity to the third material and therefore react readily with the third material. If the third material is oxygen, the first material is segregated to a first layer and the second material forms an oxide layer on the first layer." Id., col. 5, ll. 19-25.

c). "The heating step may also include the step of applying a predetermined quantity of steam such that a solubility of one of the dopants in the oxide is changed thereby changing the amount of the dopant diffused into the substrate." Id., col. 4, ll. 28-33.

d). "Boron, for example, is soluble in silicon if H_2O is present during the oxidation. Accordingly, by varying the amount of H_2O present during the oxidation, the profile of the boron doped region may be varied." Id., col. 8, ll. 48-51.

Quotes a) and b) indicate that an alloy of silicon and germanium may be selectively oxidized in an oxygen environment. Quotes c) and d) indicate that steam may be used and controlled to change an amount of dopant diffused into the substrate. Apparently, in order to have a selective oxidation of SiGe, Ast et al. only requires an

oxygen environment. The steam that may be added in the oxygen environment is only for the purpose of controlling the diffusion of dopants into the substrate and, as taught by Ast et al., contains H_2O. Thus, contrary to the Examiner's allegation, steam is NOT a condition for selective oxidation of SiGe in Ast et al.

Second, the Examiner alleged that "[i]t would have been obvious ... to oxidize the SiGe gate electrode 8a in steam as suggested by Ast." Office Action, p. 3. Applicant disagrees. Ohuchi requires selective oxidation of SiGe gate electrode 8a (Ohuchi, col. 4, ll. 44-48), while Ast et al. uses steam solely for the purpose of controlling the diffusion of dopants into the substrate. One skilled in the art would NOT have been motivated to combine the steam process taught in Ast et al. to selectively oxidize SiGe gate electrode 8a in Ohuchi.

Third, believing that Ast et al. "teaches steam is an oxidation condition in which SiGe is selectively oxidized to form silicon oxide while Ge in the SiGe layer is not oxidized" (Office Action, p. 7), the Examiner asserted that Bar-Gadda discloses "that steam for use in an oxidation process for producing silicon dioxide is generated by admitting H2 and O2 into an oxidation chamber" (Office Action, p. 3), as "a factual evidence showing the fact the oxidation atmosphere of steam of combined process of Ohuchi and Ast contains both oxidant (H_2O) and reductant (H_2)" (Office Action, p. 8). However, as noted above, in Ast et al., the steam that may be added in the oxygen environment is only for the purpose of controlling the diffusion of dopants into the substrate and **NOT** for oxidation purposes. Therefore, the discussion of Bar-Gadda, which teaches a steam process for oxidizing silicon, is irrelevant.

In conclusion, Ast et al., as evidenced by Bar-Gadda, fails to teach or suggest at least "thermal-oxidizing the gate electrode in an atmosphere that contains an oxidant for oxidizing Si and a reductant for reducing Ge to form a sidewall insulating film on a sidewall surface of the gate electrode," as recited in independent claim 10.

Moreover, Bar-Gadda only teaches a process for oxidizing silicon, not SiGe. Bar-Gadda also fails to teach or suggest at least "thermal-oxidizing the gate electrode in an atmosphere that contains an oxidant for oxidizing Si and a reductant for reducing Ge to form a sidewall insulating film on a sidewall surface of the gate electrode," as recited in claim 10.

Therefore, Ohuchi, Ast et al., and Bar-Gadda, taken alone or in combination, fail to teach or suggest each and every element of claim 10. Also, one skilled in the art would not have been motivated to combine the references to result in the claimed invention. Independent claim 10 is thus allowable under 35 U.S.C. § 103(a). Claims 11-12 depend from claim 10 and are also allowable at least because of their dependence from an allowable base claim.

In addition, independent claim 13 recites, inter alia, "thermal-oxidizing the monocrystal layer in an atmosphere that contains an oxidant and a reductant as an oxidation seed to form an oxide film made of one of said at least two kinds of semiconductors on a surface of the monocrystal layer." For reasons set forth above regarding claim 10, Ohuchi, Ast et al., and Bar-Gadda, fail to teach or suggest at least this element of claim 13. Independent claim 13 and its dependent claims 14-16 are therefore allowable under 35 U.S.C. § 103(a).

The rejection of claims 17-20 under 35 U.S.C. § 103(a) as unpatentable over APA in view of Ast et al. and bar-Gadda is also improper for the following reasons.

Independent claim 17 recites, inter alia, "wherein the gate insulating film is formed on a surface of the SiGe monocrystal layer by thermal-oxidizing the SiGe monocrystal layer in an atmosphere that contains an oxidant for oxidizing Si, and a reductant for reducing Ge, and the gate insulating film is made of substantially silicon oxide."

First, as the Examiner correctly recognized, "[t]he admitted prior art differs from the claims in that while the admitted prior art forms the gate insulating film by conventional oxidation process that results in a gate oxide film containing SiO2 and GeO2, the claims call for an oxidation process in an atmosphere that contains an oxidant for oxidizing Si and a reductant for reducing Ge so that the gate insulating film is made of substantially silicon oxide." Office Action, p. 5. In other words, APA fails to teach or suggest at least the above-quoted element of claim 17.

Moreover, for reasons set forth above regarding claim 10, Ast et al. and Bar-Gadda also fail to teach or suggest at least the above-quoted element of claim 17, and therefore fail to cure the deficiencies of APA. Independent claim 17 is thus allowable and so are claims 18-19, which depend from claim 17.

Finally, independent claim 5 recites, inter alia, "thermal-oxidizing the conductive film in an atmosphere that contains an oxidant for oxidizing the first semiconductor and a reductant for reducing the second semiconductor, to form an oxide film made of the first semiconductor on the conductive film." For reasons similar to those set forth above regarding claims 10 and 17, none of Ohuchi, APA, Ast et al., and Bar-Gadda teaches or

suggests at least this element of claim 5. Independent claim 5 and its dependent claims 6-9 are thus allowable.

In view of the foregoing, Applicant requests reconsideration of the application and timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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